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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Application No. : 10583894
Applicant : Rune
Filing Date : 06/22/2006
Date Mailed : 05/16/2011

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given 1 month(s) from the mail date of this Notice within which to respond.

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED. **This period for reply is NOT extendable under 37 CFR 1.136(a).**

See attachment(s).

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Application No. 10583894

IDENTIFICATION OF APPLICATION DEFICIENCIES

- [ ] Applicant must provide legible text for the following item(s).
  - [ ] Specification filed , page(s) .
  - [ ] Claims filed , claim(s) .
  - [ ] Oath/declaration filed .
  - [ ] Other: .
- [X] Applicant must provide missing information on the following page(s) of the specification by amending the specification to add the missing text. No new matter may be added.
  Tables 1-7 in the specification have the right margin cut off.
- [ ] Applicant must provide an Abstract of the Disclosure.
- [ ] Applicant has submitted a DECLARATION (37 CFR 1.63) FOR A UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76) (e.g., form PTO/SB/01A). The Application Data Sheet, however, is not present with the filed application. Applicant must submit an Application Data Sheet or file a new oath or declaration (e.g., PTO/SB/01) executed by the inventors and containing the information required in 37 CFR 1.63.
- [ ] Applicant must provide an executed declaration.
- [ ] Applicant must provide a declaration signed by inventor(s) .
- [ ] The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date may be required. See MPEP §§ 602.01 and 602.02. The oath or declaration is defective because:
  - [ ] It does not identify the city and either state or foreign country of residence of each inventor. The residence information may be provided on either an application data sheet or a supplemental oath or declaration.
  - [ ] The oath or declaration for the patent application was filed prior to December 1, 1997, and applicant has not given a post office address anywhere in the application papers as required by 37 CFR 1.33(a), which was in effect at the time of filing of the oath or declaration. A statement over applicant's signature providing a complete post office address is required.
  - [ ] It does not identify the mailing address of each inventor. A mailing address is an address at which an inventor customarily receives his or her mail and may be either a home or business address. The mailing address should include the ZIP Code designation. The mailing address may be provided in an application data sheet or a supplemental oath or declaration. See 37 CFR 1.63(c) and 37 CFR 1.76.
- [ ] Per 37 CFR § 1.63(a)(2), applicant must provide at least one given name without abbreviation for inventor(s) .

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	Confirmation No. 7394
Johan RUNE	Atty. Ref.: 2380-1325
Appl. No. 10/583,894	TC/A.U. 2617
Filed: June 22, 2006	Examiner: Kiet M. DOAN

For: ARRANGEMENTS AND METHOD FOR HANDLING MACRO DIVERSITY IN A UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEM

* * * * * * * * * * *

June 9, 2011

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Sir:

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

Responsive to the Notice to File Corrected Application Papers mailed May 16, 2011, Applicant submits herewith a copy of Tables 1-7 (pages 15-19, 22-23 and 33-36 of the specification) in compliance with the Notice for the above-identified application.

Applicant respectfully requests that this Notice be withdrawn and allowance of this application remains.

Should there be any outstanding matters that need to be resolved, the Examiner is respectfully requested to contact Hyung Sohn (Reg. No. 44,346), to conduct an interview in an effort to expedite prosecution in connection with the present application.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: ______________________
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Node Bs. The retrieved routes form a "route tree". Nodes where two or more routes join are called branching nodes (BNs). The RNC comprises means for selecting the best DHO node(s) based on the nodes of the route tree. To only search for DHO nodes in the route tree is a restriction, which means that potential off-tree DHO nodes, which could be more optimal than on-tree DHO nodes, are disregarded. This restriction is a trade-off to limit the complexity of the selection mechanism. If the best of all potential DHO nodes (on-tree as well as off-tree nodes) were to be sought and an optimal route tree (independent of the individual routes) were to be created, this would involve calculation of Steiner trees, which is very complex and computation demanding. Thus, although not optimal, selecting the DHO node(s) from the on-tree nodes is considered good enough for this application at least in its basic form.

A retrieved hop-by-hop route is represented by a list of IP addresses (the IP addresses of the intermediate routers and the destination Node B), accompanied by a number of metrics for each hop. The IP address of the RNC is omitted, since it is not needed for the DHO node selection process. The metrics may include one or both of a delay metric and a generic cost metric (based on arbitrary criteria). The metrics may be asymmetric, in which case one set of metrics is supplied for each direction of a link, or symmetric, in which case the same set of metrics is valid for both directions. In the illustrated example the metrics include both a symmetric delay metric and a symmetric generic cost metric. **Table 1** shows the information that could be included in the route information that the RNC retrieves in the example scenario (i.e. the scenario depicted in **figure 5**).

Route from the RNC to the Node B (NB) 1		
IP addresses (excluding the RNC)	**Symmetric generic cost metric for hop from preceding node**	**Symmetric delay metric for hop from preceding node**

1	1	1
2	1	2
8	1	3
Route from the RNC to the NB2		
IP addresses (excluding the RNC)	**Symmetric generic cost metric for hop from preceding node**	**Symmetric delay metric for hop from preceding node**
1	1	1
2	1	2
3	2	3
4	2	3
5	3	4
9	5	5
Route from the RNC to the NB3		
IP addresses (excluding the RNC)	**Symmetric generic cost metric for hop from preceding node**	**Symmetric delay metric for hop from preceding node**
1	1	1
2	1	2
3	2	3

4	2	3
5	3	4
10	4	5
Route from the RNC to the NB4		
IP addresses (excluding the RNC)	**Symmetric generic cost metric for hop from preceding node**	**Symmetric delay metric for hop from preceding node**
1	1	1
2	1	2
3	2	3
4	2	3
6	2	3
7	3	4
11	4	5
Route from the RNC to the NB 5		
IP addresses (excluding the RNC)	**Symmetric generic cost metric for hop from preceding node**	**Symmetric delay metric for hop from preceding node**
1	1	1
2	1	2

3	2	3
4	2	3
6	2	3
7	3	4
12	5	5

Table1

With reference to the example illustrated in **figure 5**, table 1 includes the routes with associated metrics received from the topology database. In this example symmetric delay and cost metrics are used.

To form a tree of the retrieved routes the RNC is adapted to see the routes as branches and to identify the branching nodes (of which there may be 1 through n-1 where n is the number of branches). To identify the branching nodes, the RNC is arranged to start with the first IP address in the respective lists and then to step one address at a time to identify when a branch diverges, i.e. when its IP address differs from the IP address of the other branch(es). The IP address before a diverging IP address in the lists represents a branching node. If two branches have no IP address at all in common, then the RNC is the branching node for these two branches. The procedure continues until all branching nodes have been identified. **Figure 6** shows the route tree that results from the example scenario of **figure 5**.

When all the branching nodes have been identified, their relative interconnections, as well as their connections to Node Bs and the RNC, are identified. Identifying these connections in essence means that the RNC is adapted to create a simplified schematic tree consisting of only branching nodes, Node Bs and the RNC (i.e. intermediate routers are omitted). As is the

case of the original route tree, this is still just a logical construction, essentially a data structure, in the RNC. It has yet no physical realization in the UTRAN. **Figure 7**, illustrates a branching node tree corresponding to the route tree in **figure 6** (i.e. the branching node tree resulting from the example scenario of **figure 5**) and table 2 shows how the branching node tree could be represented as a data table. It should be noted that BN X means branching node number X.

Branching node (BN)	IP address	Uplink connection	Downlink connections
BN1	2	RNC	BN2, IP=4 NB1, IP=8
BN2	4	BN1, IP=2	BN3, IP=5 BN4, IP=7
BN3	5	BN2, IP=4	NB2, IP=9 NB3, IP=10
BN4	7	BN2, IP=4	NB4, IP=11 NB5, IP=12

Table 2

An identified branching node may be an RNC, one of the Node Bs or an intermediate router. That is, it is not certain that a branching node is a DHO enabled node. However, for each branching node there is a corresponding potential DHO node. With a branching node as the starting point the RNC comprises means for selecting the best corresponding DHO node. To do this the RNC is arranged to make use of the cost metrics assigned to each hop and

node tree table of the DHO node selection example, i.e. the branching node tree table of table 2, may be translated into a DHO node tree table. It should be noted that DHO(BNX) represents the selected DHO node corresponding to the branching node X. **Figure 8** illustrates the resulting DHO node tree (as a part of the DHO node selection example based on the example scenario in **figure 5**).

DHO node	**IP address**	**Uplink connection**	**Downlink connections**
DHO(BN1)	8	RNC	DHO(BN2), IP=10 NB1, IP=8
DHO(BN2)	10	DHO(BN1), IP=8	DHO(BN3), IP=10 DHO(BN4), IP=11
DHO(BN3)	10	DHO(BN2), IP=10	NB2, IP=9 NB3, IP=10
DHO(BN4)	11	DHO(BN2), IP=10	NB4, IP=11 NB5, IP=12

Table 3

From table 3 it can be concluded that DHO(BN2) and DHO(BN3) are one and the same node, i.e. NB3.

DHO node	**IP address (and node name)**	**Uplink connection**	**Downlink connections**
DHO(BN1)	8 (NB1)	RNC	DHO(BN2), IP=10 (BN1 radio i/f)

DHO(BN2, BN3)	10 (NB3)	DHO(BN1), IP=8	DHO(BN4), IP=11 NB2, IP=9 (NB3 radio i/f)
DHO(BN4)	11 (NB4)	DHO(BN2, BN3), IP=10	NB5, IP=12 (NB4 radio i/f)

Table 4

Table 4 is the final DHO node tree table derived from the branching node tree table of table 2 (which is a part of the DHO node selection example based on the example scenario in **figure 5**). DHO(BN2) and DHO(BN3) have now been merged into a single DHO node, DHO(BN2,BN3).

Figure 8 shows the DHO node tree resulting from the selection of DHO nodes corresponding to the branching nodes of the DHO node selection example based on the example scenario in **figure 5**. A data representation of the DHO node tree can be found in table 4.

<u>Checking that the maximum allowed delay is not exceeded (also referred to as the delay reduction phase)</u>

When the DHO nodes are selected, the last step before instructing the UTRAN nodes to establish the route tree including the selected DHO nodes is to check that the maximum allowed transport delay between a Node B and the RNC is not exceeded. To do this, the connections in the DHO node tree are mapped onto the original route tree to form complete hop-by-hop routes. **Figure 9**

inaccurate. However, in this example it is assumed that the maximum allowed accumulated delay metrics is 45 for all the data paths.

As can be derived from **figure 9** the data path of NB1 has a downlink delay of 6 and the same value for the uplink delay. The data path of NB2 has a downlink delay of 34 and an uplink delay of 37. The data path of NB3 has a downlink delay of 24 and an uplink delay of 27. The data path of NB4 has a downlink delay of 45 and an uplink delay of 51. The data path of NB5 has a downlink delay of 55 and an uplink delay of 61.

Consequently the uplink delay for the data path of NB5 must be reduced by at least 61 - 45 = 16 and its downlink delay must be reduced by at least 55 – 45 = 10. Similarly the uplink delay for the data path of NB4 must be reduced by at least 51 - 45 = 6.

The delay reduction method starts with the data path with the greatest delay reduction needs, i.e. the data path of NB5 in this example. According to the delay reduction method, the first DHO node in the path in the direction from the Node B to the RNC should be removed first (excluding DHO nodes that are included in the original RNC-Node B route retrieved from the topology database). This means that DHO node NB4 is removed from the data path of NB5 in the first step. The resulting modified DHO node tree table and DHO node tree are shown in table 5 and **figure 10**. The resulting potential data flows in the route tree are depicted in **figure 11**.

DHO node	**IP address (and node name)**	**Uplink connection**	**Downlink connections**
DHO(BN1)	8 (NB1)	RNC	DHO(BN2), IP=10

			(BN1 radio i/f)
DHO(BN2, BN3)	10 (NB3)	DHO(BN1), IP=8	NB2, IP=9 NB4, IP=11 NB5, IP=12 (NB3 radio i/f)

Table 5. The modified DHO node tree table after the first step of the delay reduction method.

This first step reduced the uplink delay of the data path of NB5 by 13 and the downlink delay by 10. This is enough for the downlink delay, but the uplink delay has to be reduced by another 3 units. Thus, according to the delay reduction method number 5 the next DHO node in the Node B to RNC direction of the data path of NB5 is removed. This means that the DHO node NB3 is removed from the data path of NB5 in the second step. The resulting modified DHO node tree table after the second step of the delay reduction method is shown in table 6 and the DHO node tree is shown in **figure 12**. The resulting potential data flows in the route tree are depicted in **figure 13**.

DHO node	**IP address (and node name)**	**Uplink connection**	**Downlink connections**
DHO(BN1)	8 (NB1)	RNC	DHO(BN2), IP=10 NB5, IP=12 (BN1 radio i/f)

DHO(BN2, BN3)	10 (NB3)	DHO(BN1), IP=8	NB2, IP=9 NB4, IP=11 (NB3 radio i/f)

Table 6.

The second step reduced the uplink delay of the data path of NB5 by 21 (and the downlink delay by 18). This is enough and the delay reduction for the path of NB5 is thereby finalized. Then the delay reduction method may be applied to the data path of NB4. As previously stated, the uplink delay of the data path of NB4 must be reduced by 6 units whereas the downlink delay needs no reduction. However, the removal of NB4 as a DHO node of the data path of NB5 means that NB4 no longer acts as a DHO node for the data path of NB4 either. Consequently, the uplink delay of the data path of NB4 has already been reduced by 3 units. Remaining to be reduced are another 3 units. According to the delay reduction method, the first DHO node in the Node B to RNC direction should be removed from the data path of NB4. Thus, in the third step the DHO node NB3 is removed from the data path of NB4. The resulting modified DHO node tree table and DHO node tree after the third step of the delay reduction method are shown in table 7 and **figure 14**. The resulting potential data flows in the route tree are depicted in **figure 15**.

DHO node	**IP address (and node name)**	**Uplink connection**	**Downlink connections**
DHO(BN1)	8 (NB1)	RNC	DHO(BN2), IP=10 NB4, IP=11 NB5, IP=12 (BN1 radio i/f)
DHO(BN2,	10 (NB3)	DHO(BN1),	NB2, IP=9

BN3)		IP=8	(NB3 radio i/f)

Table 7.

Thus the third step reduced the uplink delay of the data path of NB4 by 21 (and the downlink delay by 18). This is enough and consequently the delay reduction for the entire DCH i.e. for all data paths is thereby finalized.

The final DHO node tree is then the basis for instructions to the selected DHO nodes and the establishment of transport bearers.

Preferred embodiments of the present invention

Realization of a DHO node tree

When the DHO nodes, also referred to as macro diversity nodes, are selected e.g. according to the above described method, the RNC instructs the DHO nodes and other affected nodes so that the intended macro diversity is established according to the present invention. DHO nodes receive instructions from the RNC by means of NBAP or RNSAP (RNSAP is only used in the inter-RNS case) and perform the following in accordance with said instructions according to embodiments of the present invention:

For the downlink:

The DHO nodes are adapted to split the downlink flow and to forward the resulting flows according to the instructions received from the RNC using the transport bearers previously established according to the instructions received from the RNC. The instructions to direct the data flows between the involved nodes may comprise IP addresses and UDP ports in an IP-based UTRAN or ATM addresses and SUGR (Served User Generated Reference) references in an ATM-based UTRAN.